

Application No. 10/725,724
Response dated: November 7, 2005
Reply to Office Action of August 5, 2005

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In the Claims

1. (original) An organic electroluminescent light emitting device, comprising:

a first electrode;

a second electrode;

at least one organic light emitting layer; and

a ceramic output coupler, which comprises a ceramic material and a plurality of voids distributed therein.

2. (original) The device of claim 1, wherein:

the device comprises an organic light emitting diode; and

the ceramic output coupler comprises a ceramic layer containing a light emitting surface of the device.

3. (original) The device of claim 2, wherein:

the ceramic output coupler reduces a critical angle loss and a Fresnel loss;
and

an index of refraction of the ceramic output coupler is matched to an index of refraction of an adjacent layer of the electroluminescent device.

4. (original) The device of claim 3, wherein the index of refraction of

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the ceramic output coupler differs by 0.1 or less from the index of refraction of the adjacent layer of the electroluminescent device.

5. (original) The device of claim 4, wherein the index of refraction of the ceramic output coupler is the same as the index of refraction of the adjacent layer of the electroluminescent device.

6. (original) The device of claim 2, further comprising a transparent substrate between the ceramic output coupler and the at least one organic light emitting layer, wherein the index of refraction of the ceramic output coupler differs by 0.1 or less from an index of refraction of the substrate.

7. (original) The device of claim 6, wherein the index of refraction of the ceramic output coupler is the same as or greater than the index of refraction of the substrate.

8. (original) The device of claim 7, wherein the index of refraction of the ceramic output coupler is the same as the index of refraction of the substrate.

9. (original) The device of claim 2, wherein the ceramic output coupler comprises a shaped ceramic material attached to the organic light emitting diode.

10. (original) The device of claim 9, wherein the shaped ceramic material comprises translucent ceramic material having a corrugated or dimpled light emitting

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surface.

11. (original) The device of claim 10, wherein each dimple has a height greater than 0.1 microns and a spacing between dimple or corrugation peaks is a factor of 10 or less of the dimple height.

12. (original) The device of claim 2, wherein the ceramic output coupler randomly volume scatters light emitted by the organic light emitting layer to reduce a critical angle loss.

13. (original) The device of claim 12, wherein the device comprises an organic light emitting diode, the ceramic coupler comprises a ceramic layer containing a light emitting surface of the device, and the ceramic output coupler volume contains voids which randomly scatter light emitted by the organic light emitting layer to reduce a critical angle loss.

14. (original) The device of claim 2, wherein the ceramic output coupler material comprises Al_2O_3 , Y_2O_3 , $\text{Y}_3\text{Al}_5\text{O}_{12}$, MgAl_2O_4 , MgAlON , AlN , AlON , or TiO_2 doped ZrO_2 .

15. (original) The device of claim 2, wherein the ceramic output coupler comprises a light emitting material.

16. (original) The device of claim 15, wherein the light emitting material

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comprises a ceramic phosphor.

17. (original) The device of claim 16, wherein the phosphor comprises YAG:Ce³⁺.

18. (original) The device of claim 2, wherein the ceramic output coupler comprises a ceramic matrix material containing light emitting particles.

19. (original) The device of claim 18, wherein the light emitting particles comprise semiconductor particles.

20. (original) A method of making an organic electroluminescent light emitting device, comprising:

forming a first electrode;

forming at least one organic light emitting layer;

forming a second electrode; and

forming a ceramic output coupler, which comprises a plurality of voids formed within a volume of the ceramic output coupler.

21. (original) The method of claim 20, further comprising:

forming the first electrode of a transparent conductive material over a first surface of a glass or polymer substrate;

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forming the at least one organic light emitting layer over the first electrode;

forming a second electrode of a metal material over the at least one organic light emitting layer; and

forming the ceramic output coupler over the second surface of the glass or polymer substrate.

22. (original) The method of claim 20, further comprising:

forming the first electrode of a transparent conductive material over the ceramic output coupler which comprises a ceramic substrate;

forming the at least one organic light emitting layer over the first electrode; and

forming a second electrode of a metal material over the at least one organic light emitting layer.